

CLAIMS

1. A retrieval device for retrieving a medical device from a body lumen, through a lesion or a treatment device proximal of the medical device, the retrieval device comprising: -

a retrieval catheter having a proximal end and a distal end, the retrieval catheter defining a retrieval space into which a medical device is retrieved; and

a centring means having an introduction configuration for introduction of the retrieval device through a lesion or a treatment device and a retrieval configuration in which the medical device is retrieved into the retrieval space of the retrieval catheter.

2. A retrieval device as claimed in claim 1 wherein the centring means is a centring catheter having a distal end, the centring catheter being mounted in the retrieval catheter for movement between the introduction configuration in which the distal end of the centring catheter projects distally from the distal end of the retrieval catheter and the retrieval configuration in which the distal end of the centring catheter is proximal of the retrieval space of the retrieval catheter.
3. A retrieval device as claimed in claim 2 wherein the centring catheter has an internal bore extending at least partially along its length for threading the retrieval device over a guidewire.
4. A retrieval device as claimed in claim 2 or 3 wherein the centring catheter is slidably movable in the retrieval catheter from the introduction configuration to the retracted retrieval configuration.

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5. A retrieval device as claimed in any of claims 2 to 4 wherein the centring catheter is removable from the retrieval catheter.
6. A retrieval device as claimed in any of claims 2 to 5 wherein a proximal end of the centring catheter extends proximally from the proximal end of the retrieval catheter for external manipulation of the centring catheter relative to the retrieval catheter.
7. A retrieval device as claimed in any of claims 2 to 6 wherein the distal end of the centring catheter is tapered distally inwardly to guide the open mouth through the body lumen.
8. A retrieval device as claimed in any of claims 2 to 6 wherein the distal end of the centring catheter is shaped to provide a smooth transition between the distal end of the centring catheter and the distal end of the retrieval catheter.
9. A retrieval device as claimed in claim 8 wherein the distal end of the centring catheter is of arrowhead shape.
10. A retrieval device as claimed in claim 8 or 9 wherein the distal end of the centring catheter is flexible.
11. A retrieval device as claimed in any of claims 8 to 10 wherein the distal end of the centring catheter is sealably engagable to the distal end of the retrieval catheter.
12. A retrieval device as claimed in claim 1 wherein the retrieval catheter has a main catheter body and the centring means is a tapered distal extension of the main body of the retrieval catheter, the tapered distal extension having an open mouth through which a medical device is retrieved.

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13. A retrieval device as claimed in claim 12 wherein at least portion of the distal extension is movable inwardly between the introduction and retrieval configurations.
14. A retrieval device as claimed in claim 13 wherein the distal extension is inverted on movement from the introduction to the retrieval configurations.
- 10 15. A retrieval device as claimed in claim 14 wherein the distal extension is of resilient elastomeric material.
- 15 16. A retrieval device as claimed in claim 12 wherein at least portion of the distal extension is movable radially outwardly between the introduction and retrieval configurations.
- 20 17. A retrieval device as claimed in any of claims 12 to 16 wherein the tapered distal extension is flexible with respect to the main body of the retrieval catheter.
- 25 18. A retrieval device as claimed in any preceding claim wherein the distal end of the centring means is at least partially radiopaque.
19. A retrieval device as claimed in any preceding claim wherein the centring means is of or coated with a material having a low coefficient of friction.
- 30 20. A retrieval device as claimed in any preceding claim wherein the retrieval catheter has a radially expansible tip at the distal end to accommodate retrieval of a medical device into the retrieval system.

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21. A retrieval device as claimed in claim 20 wherein the tip is thin-walled to ensure a low crossing profile for the retrieval device.
22. A retrieval device as claimed in claim 20 or 21 wherein the tip has sufficient axial stiffness to assist the retrieval of a medical device.
23. A retrieval device as claimed in any preceding claim wherein the diameter of the retrieval catheter varies along its length.
24. A retrieval device as claimed in any preceding claim wherein the distal end of the retrieval catheter is tapered distally inwardly to provide a smooth crossing profile for the retrieval device.
25. A retrieval device as claimed in any preceding claim wherein the medical device is mounted on or engaging with a guidewire and wherein the guidewire is pulled proximally for retrieval of the medical device into the retrieval space.
26. A retrieval device as claimed in claim 23 wherein the medical device is an embolic filter device which is mounted or engagable with on a guidewire for retrieval into the retrieval space.
27. A retrieval device as claimed in any of claims 2 to 11 and 18 to 26 wherein the inner surface of the retrieval catheter and/or the outer surface of the centring catheter is of non-circular profile over at least portion of the length thereof.
28. A retrieval device as claimed in claim 27 wherein the catheter periphery is non-circular.

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29. A retrieval device as claimed in claim 27 or 28 wherein the catheter periphery is of oval shape.

30. A retrieval device as claimed in any of claims 27 to 29 wherein the catheter periphery is shaped to define a number of separate areas of contact with the other catheter.

31. A retrieval device as claimed in claim 30 wherein the catheter periphery is of fluted shape.

32. A retrieval device substantially as hereinbefore described with reference to the accompanying drawings.

33. A method for retrieval of a medical device from a body lumen comprising the steps of:-

introducing a retrieval catheter with a centring means into a body lumen, the retrieval catheter defining a retrieval space, and the centring means having an introduction configuration for introduction of the retrieval catheter and a retrieval configuration for retrieving a medical device;

advancing the retrieval catheter across a lesion or a treatment device with the centring means in the introduction configuration;

advancing the retrieval catheter distally to the proximal end of the medical device;

retrieving the medical device into the retrieval catheter with the centring means in the retrieval configuration; and

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removing the retrieval catheter and the retrieval medical device from the body lumen.

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34. A method as claimed in claim 33 wherein the centring means is a centring catheter and the method includes the step of moving the centring catheter from an introduction configuration in which the distal end of the centring catheter projects distally from the retrieval catheter for crossing a lesion or a treatment device and a retrieval configuration in which the centring catheter is proximal of the retrieval space for retrieving the medical device.
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35. A method as claimed in claim 34 wherein the retrieval catheter and the centring catheter are introduced into the body lumen over a guidewire.
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36. A method as claimed in claim 34 or 35 wherein the distal end of the retrieval catheter expands radially outwardly during retrieval of the medical device into the retrieval catheter.
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37. A method as claimed in any of claims 34 to 36 wherein the distal end of the retrieval catheter expands radially outwardly during retraction of the distal end of the centring catheter into the retrieval catheter.
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38. A method as claimed in any of claims 34 to 37 wherein the distal end of the centring catheter is deformed as the distal end of the centring catheter is retracted into the retrieval catheter.
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39. A method as claimed in claim 33 wherein the retrieval catheter has a main catheter body, the centring mean is a tapered distal extension of the main body of the retrieval catheter and the tapered distal extension has an open mouth through which a medical device is retrieved.

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40. A method as claimed in claim 39 wherein at least portion of the distal extension is movable inwardly between the introduction and retrieval configurations.
- 5 41. A method as claimed in claim 39 wherein at least portion of the distal extension is movable radially outwardly between the introduction and retrieval configurations.
42. A method as claimed in any of claims 34 to 41 including the step of flushing and/or aspirating before retrieving the medical device into the retrieval catheter.
43. A method as claimed in claim 42 including the step of removing the centring catheter from the retrieval catheter to facilitate flushing and/or aspiration.
44. A method as claimed in any of claims 34 to 43 wherein the medical device is retrieved into the retrieval catheter by drawing the medical device proximally into the retrieval catheter.
- 20 45. A method as claimed in any of claims 34 to 43 wherein the medical device is retrieved into the retrieval catheter by advancing the retrieval catheter distally over the device.
- 25 46. A method as claimed in any of claims 34 to 45 wherein the centring catheter is removed from the body lumen before removing the retrieval catheter and the medical device from the body lumen.
- 30 47. A method as claimed in any of claims 34 to 46 wherein the medical device is an embolic filter device.

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48. A method substantially as hereinbefore described with reference to the accompanying drawings.